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EXAMINER

FENNEMA, ROBERT E

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/671,844	Applicant(s) JAMIL ET AL.	
	Examiner ROBERT E. FENNEMA	Art Unit 2183	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/29/2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-31 have been considered. Claim 31 added as per Applicant's request. Claims 1, 11, 21, and 26 amended as per Applicant's request.
2. It is noted that the Examiner of record for this case has been changed. Future correspondence should be addressed to Robert Fennema.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

1. Claim 31 is objected to for having an antecedent basis problem for referring to "The" method, yet no method has been previously introduced, thus it is appropriate to refer to it as "A" method, unless Claim 31 is supposed to be a dependent claim.

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claims 11-20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 11-20 claim an article of manufacture

including a machine readable medium which the specification defines as including, "an optical or electrical wave 660 modulated or otherwise generated to transport such information," which has been found to be non-statutory.

In order to overcome the rejection, not only does the Applicant need to cancel the non-statutory material from the specification (which has been done), but there also must be an explicit disavowal of those limitations in the remarks such that there will be no attempt to claim that subject matter. If this is done in the next response, the Examiner will withdraw the 101 rejection of the claims.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-9, 11-19 and 21-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Merchant et al. (US Patent 6,385,715, herein Merchant).

1. As per claim 1, Merchant teaches a method comprising:

issuing an instruction selected from a queue (column 3, lines 25-33; column 3, lines 43-47);

enqueueing the instruction issued within a recirculation queue in one of a blocked

state and an unblocked state if completion of the instruction is prevented by a detected blocking condition (column 8, lines 42-53); and

reissuing a selected instruction from the recirculation queue if a detected blocking condition of at least one instruction within the recirculation queue, other than the selected instruction, is satisfied (column 8, lines 42-53. Also see Column 15, Lines 22-32. Multiple instructions can be in the queue, and when one is satisfied, it can go).

1. As per claim 2, Merchant teaches:

The method of claim 1, wherein issuing comprises:

arbitrating between a plurality of queues to select a queue (column 9, lines 42-52);

selecting a current instruction from the queue selected (column 9, lines 42-52);
and

issuing the current instruction for the queue selected (column 9, lines 42-52).

2. As per claim 3, Merchant teaches the method of claim 2, wherein issuing the current instruction comprises:

determining a state of the current instruction (column 9, lines 58-64);

selecting an alternate queue from the plurality of queues if a state of the selected instruction is blocked (column 9, lines 65-67); and

issuing an instruction selected from the alternate selected queue (column 9, lines 42-55).

3. As per claim 4, Merchant teaches the method of claim 1, wherein enqueueing comprises:

detecting the blocking condition prohibiting the instruction issued from completion (column 8, lines 54-67);

placing the instruction within the recirculation queue (column 9, lines 1-8); setting a state of the instruction as blocked to prohibit reissue of the instruction (column 9, lines 25-33) (All instructions in the replay queue are blocked and will not be not be reissued until the blocking condition has been cleared.); and

storing the detected blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

4. As per claim 5, Merchant teaches the method of claim 1, further comprising:

identifying blocking conditions of instructions within the recirculation queue (column 12, lines 51-57);

determining whether any blocking condition of any instruction within the recirculation queue is satisfied (column 12, lines 51-57);

enabling recirculation of instructions from the recirculation queue by setting a state of each instruction within the recirculation queue to an unblocked state if any blocking condition is satisfied (column 12, lines 58-60).

5. As per claim 6, Merchant teaches the method of claim 1, wherein reissuing instructions comprises:

receiving a request to issue an instruction contained within the recirculation queue (column 12, lines 51-55) (The data return signal is a request to issue since instructions are issued based on the receiving of data.);

determining a state of a current instruction of the recirculation queue (column 12, lines 55-57);

issuing the current instruction if the state of the current instruction is an unblocked state in response to the received request (column 12, lines 57-60; column 12, lines 14-21); and

disregarding the request if the state of the current instruction is a blocked state (column 12, lines 57-60; column 12, lines 14-21) (The unloading controller chooses which of the replay queues should be unloaded based on the data return signal Based on the control signals to the mux, the instruction is either issued if it was the instruction chosen by the unloading controller or denied if it was not chosen.).

6. As per claim 7, Merchant teaches the method of claim 1, wherein enqueueing comprises:

determining whether the detected blocking condition preventing the instruction issued from completion is a transient blocking condition (column 9, lines 1-4; column 7, lines 1-9) (Placing instructions in the replay loop is a determination of a transient blocking condition since it is timed sensitive condition based on an L0 cache miss, L1

hit. The loop is designed to provide enough time for the data to be there by the time the instruction is reissued.);

setting a state of the instruction to an unblocked state if the detected blocking condition is transient (column 8, lines 65-67; column 9, lines 1-8) (As was discussed above, instructions are only in a blocked state if they are put in the replay queue. Since transient instructions are put in the replay loop, they are not blocked and ready for issue as soon as they arrive at the mux.); and

resetting a state of each instruction within the recirculation queue to an unblocked state (column 9, lines 28-36).

7. As per claim 8, Merchant teaches the method of claim 1, wherein reissuing selected instructions comprises:

issuing an unblocked instruction in response to a received request (column 9, lines 28-36),

enqueueing the reissued instruction if a blocking condition of the instruction remains unsatisfied (column 7, lines 9-12);

setting a state of the reissued instruction to a blocked state (column 8, lines 42-53); and

storing the blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

8. As per claim 9, Merchant teaches the method of claim 1, wherein the detected blocking condition is one of a data blocking condition and a resource blocking condition (column 8, lines 13-16).

9. As per claims 11-19:

Claims 11-19 recite the same limitations for a product of manufacture containing instructions for executing the method of claims 1-9.

Although Merchant et al. do not explicitly disclose a product of manufacture containing instructions for executing the method described above, such is inherent since it is impossible to execute the method unless it is embodied in some form of computer readable medium.

Therefore, claims 11-19 are rejected for the same reasons as claims 1-9.

10. As per claim 21, Merchant teaches: An apparatus, comprising:

a received instruction queue to store received instructions (column 3, lines 25-33; column 3, lines 43-47);

a recirculation queue (Figure 1, the combination of loop 156 and queue 170, starting at controller 154); arbitration logic to select one of the received instruction queue and the recirculation queue from which to issue a current instruction (column 9, lines 42-52); and

blocked instruction detection logic to identify instructions blocked from execution by detected blocking conditions, and to enqueue the instructions onto the recirculation

queue in one of a blocked state and an unblocked state, including a respective blocking condition of each instruction within the recirculation queue, wherein instructions having a transient blocking condition are enqueued onto the recirculation queue in the unblocked state (column 9, lines 1-8).

11. As per claim 22, Merchant teaches: The apparatus of claim 21, wherein the blocked instruction detect logic further comprises:

blocked condition satisfaction logic to detect whether a blocking condition of an instruction within the recirculation queue is satisfied and to set a state of each instruction within the recirculation queue to an unblocked state if a blocking condition of an instruction within the recirculation queue is satisfied (column 9, lines 25-36).

12. As per claim 23, Merchant teaches: The apparatus of claim 21, wherein the arbitration logic to determine a state of a selected instruction, select the received instruction queue if a state of the selected instruction is blocked, and issue an instruction selected from the received instruction queue (column 9, lines 64-67).

13. As per claim 24, Merchant teaches: The apparatus of claim 21, wherein the blocked instruction detect logic to determine whether the detected blocking condition is a transient blocking condition (column 9, lines 1-4; column 7, lines 1-9) (Placing instructions in the replay loop is a determination of a transient blocking condition since it is timed sensitive condition based on an L0 cache miss, L1 hit. The loop is designed to

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provide enough time for the data to be there by the time the instruction is reissued.), set a state of the instruction placed within the queue to an unblocked state if the detected blocking condition is transient (column 8, lines 65-67; column 9, lines 1-8), and reset a state of each instruction within the recirculation queue to an unblocked state to enable reissue of instructions contained within the recirculation queue (column 9, lines 28-36).

14. As per claim 25, Merchant teaches: The apparatus of claim 21, wherein the blocked instruction detect logic to enqueue a reissued instruction if a blocking condition of the instruction remains unsatisfied (column 7, lines 9-12), to set a state of the reissued instruction to a blocked state (column 8, lines 42-53) and to store the blocking condition (column 12, lines 51-57) (The fact that the replay unloading controller can selectively choose which long latency instruction is referenced by data return signal shows that the blocking condition was stored.).

15. As per claim 26, Merchant teaches: A system comprising:

- a memory controller coupled to a memory (column 4, lines 20-23);

- a processor coupled to the memory via a bus (Figure 1, item 100), the processor including:

- a bus interface unit coupling an execution core to a cache memory including:

- a received instruction queue to store received instructions (column 3, lines 25-33),

- a recirculation queue (Figure 1, the combination of loop 156 and queue 170,

starting at controller 154), arbitration logic to select one of the received instruction queue and the recirculation queue from which to issue a current instruction (column 9, lines 42- 52), and

blocked instruction detection logic to identify instructions blocked from execution by detected blocking conditions, and to enqueue the instructions onto the recirculation queue in one of a blocked state and an unblocked state, including a respective blocking condition of each instruction within the recirculation queue, wherein instructions having a transient blocking condition are enqueued onto the recirculation queue in the unblocked state (column 9, lines 1-8).

16. As per claim 27-30, Claims 27-30 recite the same limitations as claims 22-25 and are rejected for the same reasons.

17. As per Claim 31, Merchant teaches: The method comprising:

Issuing an instruction selected from a queue (column 3, Lines 25-33; column 3, lines 43-47);

enqueueing the instruction issued within a recirculation queue in one of a blocked state and an unblocked state if completion of the instruction is prevented by a detected blocking condition (column 8, lines 42-53);

resetting a state of at least one selected instruction within the recirculation queue if a detected blocking condition of at least one instruction within the recirculation queue, other than the at least one selected instruction, is satisfied (column 8, lines 42-53); and

reissuing a current instruction from the recirculation queue if a state of the current instruction is indicated as the unblocked state (column 8, lines 42-53).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Merchant, in view of Official Notice.

20. As per claims 10 and 20:

Merchant et al. do not explicitly disclose using a circular queue. However, they do disclose using a FIFO queue (Merchant et al.: column 9, lines 33-36). Using a circular FIFO queue is well-known in the art since it is easier to use a circular FIFO queue than shifting each entry after each dequeue (Official Notice).

Response to Arguments

21. Regarding Applicants regarding Claim 1, and how the art does not teach the new limitations of the claim, Examiner refers the Applicant to the claim rejection, where Examiner has provided a grounds of rejection in light of the new claim limitations.

22. Regarding Applicants regarding Claim 21, in light of the amendment to the claims, Examiner has provided a new rejection using Merchant which teaches the claimed limitations. The claims require two paths: one with a receiving instruction queue and one with a recirculation queue, and one or the other is chosen to forward instructions to be executed. In light of the amendment, Examiner has re-interpreted Merchant to consider the path that goes through the Replay Queue Loading Controller 154 to be one path and one "queue", despite it diverging later on. When the replay loop and replay queue are considered as a whole, they fulfill the limitations of the claim, and Examiner believes it is reasonable to interpret them as such, since they share common elements.

Conclusion

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ROBERT E. FENNEMA whose telephone number is (571)272-2748. The examiner can normally be reached on Monday-Friday, 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4162. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Eddie P Chan/
Supervisory Patent Examiner, Art Unit 2183

Robert E Fennema
Examiner
Art Unit 2183

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